METHOD OF PRODUCING FILTER-TIPPED CIGARETTES

TECHNICAL FIELD

The present invention relates to a method of producing filter-tipped cigarettes.

BACKGROUND ART

As described, for example, in GB-2241866-A, filter-tipped cigarettes are known to be produced on a filter assembly machine defining internally a path along which elongated tobacco articles are fed in a direction crosswise to their respective axes. The above known filter assembly machine receives, at an input, a succession of first tobacco articles - hereinafter referred to as "double portions" - which, travelling transversely along said path through a cutting station, are each cut into two coaxial single portions. The single portions of each double portion are then spaced axially and separated by the interposition of a double filter, which is fed to the double portion feed line by a separate feed line, and forms, together with the relative pair of single portions, a second tobacco article hereinafter referred to as a "group".

The component parts of each group are then connected integrally to one another at a rolling station by means of a gummed strip to form a third tobacco article - hereinafter referred to as a "double cigarette" - wherein a central portion of the strip covers the double filter, and the end portions of the strip cover the facing ends of the two single cigarette portions.

As anyone skilled in the art knows, rolling the groups to form the relative double cigarettes is a highly critical step, in that rolling speed, which is a direct function of the output rate of the filter assembly machine, must be kept within a given maximum value to avoid tobacco fallout from the open ends of the single portions.

For a given output rate of the filter assembly machine, rolling speed is also known to depend directly on the pitch with which the succession of groups is fed to the rolling station.

In connection with the above, it should be pointed out that, for reasons depending mainly on the structure of the devices feeding the double portions to the filter assembly machine, the standard pitch with which the groups are fed to the rolling station is relatively long (about 37.7 mm) and, though simplifying various handling operations upstream from the rolling station, is directly and largely responsible for the rolling speed of the groups.

US-5349968-A1 discloses a method of producing filter-tipped cigarettes, in which an orderly succession of first tobacco items, each consisting of a double cigarette portion, is fed along a path, along which the first items are cut into two portions, which are connected by rolling, and by means of an outer band and the interposition of an intermediate double filter, to form an orderly succession of second items, which are cut to form a first and second succession of third items

consisting of single, side by side, oppositely-oriented cigarettes; the cigarettes in one of the two successions being turned over 180 DEG in relation to those in the other succession to form at least one stream of equioriented cigarettes for supply to a follow-up machine. The pitch of the various successions of items undergoing only one change along the entire path and in particular the pitch is reduced downstream from a rolling station.

To reduce rolling speed or increase the operating speed of the filter assembly machine without increasing rolling speed, US-5474091-A1 proposes feeding the double portions to the filter assembly machine with a shorter than standard pitch, i.e. a pitch approximately equal to but no shorter than the length of the strips used - in actual practice, a length ranging between approximately 32 and 20 mm. According to a different embodiment shown in figure 3, US-5474091-A1 proposes reducing the pitch of the items to the above shorter pitch immediately upstream from a rolling station.

Experience has shown, however, that, on the one hand, feeding the double portions to the filter assembly machine with a reduced pitch calls for pitch-reducing devices external to the filter assembly machine and difficult to assemble and use, and, on the other hand, increasing the operating speed of the filter assembly machine by reducing the pitch just prior to rolling affects the reliability of the double filter feed line, which is in no way affected by the pitch reduction.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a method of producing filter-tipped cigarettes, designed to eliminate the aforementioned drawbacks.

More specifically, it is an object of the present invention to provide a method capable of maximizing the output rate of the filter assembly machine, not only for a given rolling speed, but also for a given double filter supply speed.

According to the present invention, there is provided a method of producing filter-tipped cigarettes

as claimed in Claim 1 and, preferably, in any one of the following Claims depending directly or indirectly on Claim 1.

According to the present invention, there is also provided a method of producing filter-tipped cigarettes as claimed in Claim 10.

BRIEF DESCRIPTION OF THE DRAWINGS

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which Figures 1 and 2 show schematic side views of a first and second portion respectively of a system for implementing the method constituting the object of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Number 1 in Figure 1 indicates as a whole a system for producing filter-tipped cigarettes, and comprising a known cigarette manufacturing machine 2. Machine 2 in turn comprises an output plate 3, along which a continuous cigarette rod (not shown) is fed at substantially constant axial speed and divided by a known cutting head (not shown) into a succession of double portions 4.

The cutting head (not shown) is rotated in known manner at such a speed as to produce double portions 4 of a length equal to the sum of the lengths of the tobacco-containing portions of two filter-tipped cigarettes being produced.

Number 5 in Figure 1 indicates as a whole a filter

assembly machine, a known input unit 6 of which transfers double portions 4 successively in known manner from output plate 3 of manufacturing machine 2 into respective seats 7 equally spaced with a pitch P1, normally of 37.7 mm, along the periphery of a roller 8 defining an input roller of filter assembly machine 5 and rotating anticlockwise in Figure 1 at constant angular speed.

In a variation not shown, manufacturing machine 2 is a dual-rod machine; in which case, double portions 4 are picked up in pairs, one for each rod, off plates 3 and transferred to roller 8 by a known input unit, preferably of the type described in US Patent No. 4,645,063.

Input roller 8 feeds double portions 4, crosswise to their respective longitudinal axes, along an input portion of an initial portion S1 of a path B extending along the whole of filter assembly machine 5, and transfers double portions 4 successively to respective seats 9 equally spaced with said pitch P1 along the periphery of a roller 10, which is powered to rotate clockwise in Figure 1, is located tangent to input roller 8, and conveys double portions 4 with their ends contacting an aligning plate 11, which aligns them perfectly with one another crosswise to their travelling direction.

Once aligned, double portions 4 are fed by roller 10, still along portion S1 of path B, through a known cutting station 12, where each double portion 4 is cut into two portions 13 and 14, which remain aligned inside

seat 9 and substantially contacting each other end to end.

At a transfer station 15, roller 10 is tangent to side by side rollers 16 and 17 of a parting or axial spacing assembly indicated as a whole by 18.

In the example shown, parting assembly 18 is of the type described in US Patent No. 4,531,629, to which full reference is made herein for the purpose of full disclosure, though other types of parting devices, such as that described in US Patent No. 4,200,179, may obviously be used in place of parting assembly 18 shown.

At transfer station 15, portions 13 and 14 occupying each seat 9 are transferred to respective seats 19 and 20, which, in known manner, are wider than seats 9 and spaced along the peripheries of respective rollers 16 and 17 with pitch P1.

By virtue of parting assembly 18, whose rollers 16 and 17 are offset in height, the portions 13 and 14 formerly aligned inside each seat 9 are parted axially by a distance substantially equal to the length of a double filter 21, and are fed, at a transfer station 22 defining an output end of initial portion S1, into seats 23, which, in known manner and like seats 19 and 20, are wider than seats 9 and spaced, with a shorter pitch P2 than P1, along the periphery of a roller 24 substantially tangent to rollers 16 and 17 and defining the input roller of a first intermediate portion S2 of path B.

More specifically, pitch P2 ranges between 30 and 32

mm, and is normally 31 mm.

The pitch reduction from P1 to P2 is made possible by portions 13 and 14, as they are transferred from rollers 16 and 17 to roller 24, rolling backwards in known manner along the relative wider seats 19 and 20 before being inserted into seats 23.

Roller 24 is parallel to roller 10, and defines an output portion of both portion S1 of path B and a line 25 supplying double filters 21, and which comprises an output roller 26 having seats 27 spaced with the shorter pitch P2 along the periphery of roller 26.

Roller 26 feeds each double filter 21 to a relative seat 23 at a loading station 28 located upstream from transfer station 22. More specifically, roller 26 feeds each double filter 21 into a substantially central portion of respective seat 23 corresponding to the gap between the facing ends of the relative pair of portions 13 and 14, so that, once fed into respective seat 23, each double filter 21 defines, inside seat 23, two vacant end portions, which are eventually occupied by respective coaxial portions 13 and 14 to form, on roller 24, a group 29 defined by two portions 13 and 14 separated by a double filter 21.

Roller 24 feeds groups 29 successively, with the shorter pitch P2, to seats 30 of a roller 31, which is located along portion S2 and feeds groups 29 successively through a loading station 32 for loading a succession of strips 33 fed with the shorter pitch P2 to roller 31 by a

feed line 34.

Each strip 33 integrally connects portions 13 and 14 and double filter 21 of a respective group 29, and is of a length approximately equal to but no less than the length of the outer periphery of portions 13 and 14, and approximately equal to but no greater than pitch P2, which is just sufficient to enable each strip 33 to engage a relative group 29 along an outer generating line of group 29, and to project from relative group 29 towards, and without contacting, the adjacent upstream group 29.

A pitch P2 of 31 mm provides for producing cigarettes of any currently used size (roughly 8.6 mm maximum diameter), though shorter pitches P2 may obviously be used in the case of machines producing given sizes.

A known rolling unit 35 is located immediately downstream from roller 31, and comprises a roller 36 having seats 37 spaced with the shorter pitch P2 along the periphery of roller 36, and each for receiving in known manner from roller 31 a relative group 29 and a relative strip 33. Roller 36 feeds groups 29 and relative strips 33 to a rolling station 38, which is defined by a fixed plate 39 facing the outer periphery of roller 36 and defined, in known manner on the side facing roller 36, by a knurled cylindrical surface portion coaxial with roller 36 and separated from an outer cylindrical surface of roller 36 by a distance approximately equal to but no

greater than the diameter of a portion 13, 14.

On entering the channel between plate 39 and the outer periphery of roller 36, each group 29 rolls backwards about its axis and out of relative seat 37, so that relative strip 33 winds about relative double filter 21 and the end portions, facing double filter 21, of relative portions 13 and 14 to form a double cigarette 40.

As described in US Patent No. 5,349,968, to which full reference is made herein for the purpose of full disclosure, double cigarettes 40 roll backwards, during rolling, along the periphery of roller 36, so as to reduce their pitch, by the end of plate 39, to a pitch P3 substantially equal to half pitch P2 and normally of 16-17 mm. At the end of plate 39, double cigarettes 40 are transferred, with pitch P3 and at a transfer station 41, into respective seats 42 spaced with pitch P3 along the periphery of a roller 43. Roller 43 defines the input roller of a second intermediate portion S3 of path B, and transfers double cigarettes 40 to a further roller 44 for feeding double cigarettes 40 through a cutting assembly 45, which cuts double cigarettes 40 in half to produce, from each double cigarette 40, two coaxial single cigarettes 46 with their filters facing and contacting end to end.

At a transfer station 47 defining the output end of portion S3, each pair of single cigarettes 46 is transferred to respective aligned seats 48a and 48b on a

roller 49 of a turnover unit 50 defining the input of an output portion S4 of path B. As described in US Patent No. 4,090,602, to which full reference is made herein for the purpose of full disclosure, seats 48a are fixed with respect to roller 49, whereas each seat 48b is movable with respect to roller 49, and rotates obliquely 180° with respect to roller 49 into a position between two respective adjacent seats 48a, so as to form a succession of equioriented single cigarettes 46, which are spaced with a pitch P4 equal to half pitch P3, are positioned substantially contacting one another laterally, and are transferred, with pitch P4 and through a succession of known work stations (not shown) located between two rollers 51 and 52, to an output roller 53, and onto an output conveyor 54 terminating portion S4 and path B.

As will be clear from the foregoing description, by making the pitch reduction from P1 to P2 upstream from station 28 loading double filters 21, both double filters 21 and strips 33 can be supplied with the shorter pitch P2 and therefore at a slower speed.

In connection with the above, it should be stressed that, though the pitch reduction from P1 to P2 is made in the example shown at the end of portion S1, and in particular as portions 13 and 14 are transferred from portion S1 to portion S2, the same advantages are obtained by making the same pitch reduction at any point along portion S1.